LAST ONE!

Customer gets a copy

Return this to the floor

LAST ONE!

Dranetz
626-PA-60012
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TM-110532

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WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110532

VOLUME I

OPERATOR'S MANUAL

626-PA-6012

COMMUNICATIONS MODULE

27 January 1983

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DRANETZ

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626-PA-6012 COMMUNICATIONS MODULE

1 INTRODUCTION

This manual provides operating instructions for the 626-PA-6012 Communications Module Plug-in, hereinafter referred to as the 6012. The 6012 is designed for installation in the Model 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in TM-106650.

2 PURPOSE

The 6012 provides a bidirectional interface for remote operation via the phone lines, stores all of the data outputted from the RS232C port of the 626 in its own stack memory, and then retransmits it over the phone lines at a user-programmed mode and time. The module is also capable of automatically answering a phone call. Once the logon procedure is successfully completed, the 6012 transparently receives commands from the user over the phone lines and transmits the 626 output back to the user. It is also capable of transmitting the stored output data upon request.

3 CONFIGURATION

The 6012 is a double module, occupying two channels (preferably 1 and 2). It is connected to the RS232C communications port of the 626 via a 626/6012 Interface Cable (DEL P/N 110540). The 6012 is connected to the phone lines via a standard RJ11C jack on the rear panel. A red LED on the rear panel is lit whenever the phone line is active (OFF-HOOK).

The module consists of two PC boards. One is an FCC-registered, full duplex, 300 baud modem. The other is a CPU/Module Interface board. It contains the modem control, RS232C Interface, and 626 Module Interface circuitry, as well as the stack memory (8k or 16k of CMOS RAM).

4 FUNCTIONAL DESCRIPTION

The 6012 is connected to the Communications Port of the 626 mainframe via the Interface Cable. The 6012 is configured as a DTE (Data Terminal Equipment), while the 626 is a DCE (Data Communications Equipment). The Data Set Ready (DSR) and Clear to Send (CTS) lines are monitored by the 6012. Any loss of the DSR results in a disturbance printout from the module. The CTS line is allowed to be busy for a maximum of 80 mSec.

The baud rate of the RS232C port of the 6012 is determined by the 626 RS232C port's baud rate, using the Xmit/Rcv clock signal. Data sent to the 6012 is processed on an interrupt basis and stored in the RAM stack until the time that it is transmitted, or memory becomes full. If any

data should be missed as a result of an overflow, or in the extremely unlikely occurrence of the 6Ø12 being unable to service the interrupt in time, a special character ($) is stored in memory in place of the overrun character to indicate missing data.

When the proper conditions of the user-selected transmit mode are met, the 6Ø12 will attempt to call the user-programmed phone number. If no dial tone is received, the phone is hung up and a "NO DIAL TONE" Event message is printed by the module. If the dial tone is present, but the receiving end is busy or not operating properly, the 6Ø12 will hang up and then re-dial a maximum of 128 attempts before printing a "NO CALL-128 TRIES' event message and disabling the modem (phone status will be "BAD").

If the call is completed successfully and the handshaking is completed, the module first transmits "STATION#XX", where XX is the user-programmed ID number. In the case of multiple units calling a single location, this identifies which of the units is calling in. (The module also prints a "PHONE CALL OUT" event message via the mainframe.) The data is then transmitted asynchronously in 1k blocks, using 1Ø-bit ASCII format, in comparable ISO 1745, by an interrupt-driven routine to allow for maximum throughput. When either a block is completed or the end of the data is reached, the 6Ø12 waits a maximum of 1Ø seconds and looks for either a positive or negative acknowledge character, or end of transmission character. If the negative acknowledge character is received, the last block of data is retransmitted. Upon completion of the retransmit, the 6Ø12 goes back in the 1Ø-second wait loop. If a positive acknowledge character is encountered, the wait loop is instantly terminated and the next block of data is transmitted. If the end of transmission character is received, the call is instantly terminated (with a corresponding "PHONE CALL DONE' event message.) If no character is received, and the wait loop times out, then the next block is transmitted.

This process continues until all of the data is transmitted. At this time, an "END OF XMIT" message is sent after the wait time, and the 6Ø12 sends "BYE" over the phone lines (along with DLE and EOT control characters). The phone line is then disconnected and the busy status is cleared. A "PHONE CALL DONE" event message will then be printed. If, at any time, the phone link is broken or disturbed for more than 5Ø Msec, the call will be terminated and a "PHONE LINE DEAD" event message will be printed. Under these conditions, only the character being transmitted when the break in communications happened will be lost.

If a call is received by the 6Ø12, it first turns the DTR line on, to put the phone off hook. At the end of a ring, the DSR is automatically turned on. It then waits the required 2 seconds for billing time, turns RTS on and then sends an answer back tone. The 6Ø12 waits a maximum of 2.5 seconds for a Carrier Detect (DCD). Once the carrier is established, the 6Ø12 sends a '?', and waits a maximum of 16 seconds, looking for the sequence "IDXX", where XX is again the station identifier. If this is not received, the 6Ø12 disconnects the phone line. This helps deter unauthorized access to the unit, and makes it more difficult for someone (or something) to try to "guess" the required access code.

If the proper characters are received, the 6012 waits 1 second and sendsthe message "XX-READY", to inform the user that the system is ready to receive data. This 1 second wait allows for any other 626s connected on the same phone line (like multiple extensions) to hang up, and only the one with the correct ID to answer. The 6012 is placed in the receiver mode which is a transparent operation to the remote user. All data received from the remote end is sent to the 626 mainframe's RS232C port via a 112-character buffer. Characters outputted by the 626 during this time are stored in the stack memory, as usual, and are also transmitted over the phone lines via a 112 character buffer. If the 626's baud rate is faster, data will be transmitted to the 6012 faster than it can be sent out over the phone lines. For this reason, it is advisable that the baud rate of the mainframe be set to that of the modem (300 baud) if the user intends to call up the unit and operate it remotely.

Once the link is successfully established, a "PHONE CALL IN' event message is printed by the 6012. If the carrier should drop for more than 2.5 seconds, then the 6012 will terminate the call and print the "PHONE LINE DEAD" event message. Similarly, when a call is properly terminated by an End of Transmission character (EDT), "BYE" is sent over the phone lines and the "PHONE CALL DONE" event message is printed. This gives the user a record of all phone call activity.

Only the special stack dump character (:) is intercepted by the 6012. If this character is received, a check is made to see if the unit is in the immediate mode. If not, a "NOGO" message is sent, followed by "BYE" and the call is terminated (PHONE CALL DONE0. This again is done to deter unauthorized access to the data, for once the data is transmitted, it is cleared out permanently from memory. If the immediate transmit mode is in effect, the receiver mode is suspended until all the data is transmitted as described above. After completion of the stack dump, the 6012 returns to the transparent receiver mode.

The CPU on the 6012 communicates with the module interface software via a mailbox technique. Either software program can request control of the common RAM, provided the other side doesn't have control. Simultaneous requests are prevented by clock phasing. Once the request is granted, the RAM can be written to or read. Data is passed back and forth between the 6012 CPU and the Module Interface in this manner. To signal the other side that new data is there or that certain data is requested, an IRQ line for each side can be set, and then cleared when the other side acknowledges it. Since the CPU could generate interrupts faster than the Module Interface could process them, a 16-byte stack is used by the 6012 CPU to send the interrupts whenever possible. Any error conditions, data status requests, and program parameter changes are exchanged in this manner.

The system check routine of the 6012 checks the memory, the RS232C port and the modem port status. The memory is swapped out page by page, and a series of test characters is written in, read back and compared. This determines the size of valid memory. The status lines of the RS232C port are checked. The modem is checked by selecting a TEST line which loops the output of the transmitter to the receiver just behind the OFF-HOOK

switch. A series of characters is then sent out, received and compared to determine the status of the modem. This checks nearly all of the modem circuitry except the OFF-HOOK switch and the dialer circuitry. In the event that the modem was previously turned off for any reason, a successful completion of the system check routine will re-enable the modem. Similarly, any failure to successfully complete the system check will result in the modem being disabled, and a "MODEM DEAD" event message will be printed.

The module software interfaces to the 626 CPU. It handles the printing of event data, program and system check printouts, as well as the program routine, for the user-programmable parameters. It runs independently of the 6Ø12 CPU program, except when a conflict for control of the common RAM exists, or when it is waiting for a data response from the 6Ø12 CPU software. A slight delay of the POWER ON sequence of the mainframe will occur when the 6Ø12 is present. Other than this, its presence is not felt during normal operation.

5 EQUIPMENT CHARACTERISTICS

I. Memory
- A. Size: 8k or 16k (versions A or B)
- B. Type: CMOS RAM
- C. Allocation: CPU-1k (inc. 16 byte IRQ stack, and two 112 buffers for remote receiver mode buffering)
  DATA STACK - 6k or 14k
  REXMIT STACK - 1k
- D. Typical Event Capacity: 2ØØ or 45Ø (@ 32 characters/event)

II. Communications Port
- A. Type: RS232C compatible
- B. Connection: to 626 comm. port via Interface Cable P/N 11Ø54Ø
- C. Baud Rate: Selected by transmit clock of 626 RS232C port.
- D. Data Processing:
  1) Received from RS232C port on interrupt basis
  2) Transmitted to RS232C port on non-interrupt basis.

III. Phone Line
- A. Type: standard, -9 dB, permissive, 2 wire phone line
- B. Connection: standard RJ11C phone jack

IV. Modem
- A. Baud Rate: Ø-3ØØ asychronous
- B. Type: Bell 1Ø3 compatible, full duplex
- C. Modulation: Binary, FSK
- D. FCC Registration Number: AK396F-69817-DM-F
- E. Ringer Equivalence: Ø.2B
- F. Data Processing:
  1) Received from phone line on non-interrupt basis
  2) Sent over phone line on interrupt basis when stack data is being transmitted, and on non-interrupt basis when in receiver mode.

G. Transmitter:

1) Transmit Frequency:
   a) Originate: Mark- 1270 Hz +/- 1%
      Space- 1070 Hz +/- 1%
   b) Answer: Mark- 2225 Hz +/- 1%
      Space- 2025 Hz +/- 1%
2) Transmit Level: -9 dB (permissive)
3) Clear to Send Delay:
   a) Originate: 300 +/- 45 mSec from CD
   b) Answer: coincident with Carrier Detect
4) Answer tone timing: 2.56 +/- 0.5 sec
5) Soft carrier turnoff: 26.6 +/- 5 mSec.

H. Receiver:
1) Receive Frequency:
   a) Originate: Mark- 2225 Hz +/- 1%
      Space- 2025 Hz +/- 1%
   b) Answer: Mark- 1270 Hz
      Space- 1070 Hz +/- 1%
2) Receiver Sensitivity: -8 to -45 dB
3) Carrier Dropout: -45 dB +/- 3 dB
4) Carrier Detect Delay:
   a) ON: 150 mSec +/- 30 mSec
   b) OFF: 50 mSec +/- 10 mSec
5) Hysteresis: 2 dB min.

V. CPU/Interface Board

A. Processor type: 6502

B. Power consumption: +12v dc @ 130 mA typ.
   -12v dc @ 100 mA typ.
   +5v dc @ 445 mA typ.

C. Dialer Section
1) Type: pulse
2) Rate: 10 pulses/sec max
3) Make/break ratio: 61% low, 39% high
4) Digit capacity: 16, including WAIT-FOR-DIAL-TONE digits
5) Max wait for dial tone: 1.8 sec typ.
6) Time to dial: depends on phone number digits and length
7) Max retries if call not completed: 128
8) Wait time between retries: 2 sec typ
9) Max wait for answer back tone (ABT) to begin: 12 seconds

D. System Check Test
1) Checks memory size by writing and reading back a series of test characters.
2) Checks RS232C port control lines.
3) Checks modem by looping back transmitter to receiver, and writing and reading back a series of test characters.

VI. Data Transmission Procedure

A. Call Initiation Procedure

1) Enables DTR and Dial Enable
2) Waits max 1.8 sec for dial tone
3) Dials digits
4) Upon completion of successful dial, DSR turns on
5) 2 second billing time
6) 3 second ABT
7) RTS turns on, waits for CTS
8) Sends "STATION #XX" message before beginning to transmit data

B. Block Length

1) Length: 1Ø24 characters
2) Time/block: 4Ø sec typ.
3) Output format: 1 start bit, 7 bits ASCII data, even parity,and 2 stop bits
4) Overrun Character: $

C. Retransmit Conditions

1) Checks for:
    a) Neg. acknowledge (^U)
    b) Pos. acknowledge (^F)
    c) End of transmission (^D)
2) Max wait time: 1Ø seconds
3) Max retransmit requests: infinite

D. Call Answering Procedure

1) Enables DTR on detection of ring
2) Waits 2 sec for billing time
3) Turns RTS on
4) Checks for DSR to turn on (max Ø.75 sec)
5) Waits for DCD to be activated (max 7 sec)
6) Checks for CTS and transmitter empty (max 1 sec)
7) Waits 1 sec and sends '?'
8) Waits for 'IDXX', where XX is station ID (max 16 sec)
    Failure of step 5, 6 or 8 results in hangup
    Failure of step 6 results in 'modem dead'
9) Waits 1 sec and sends "XX-READY" message

E. Call Termination Conditions

1) If modem fails to pass system check
2) When attempting to call out and no ABT in specified time
3) If finished transmitting stack and not in rcv. suspended (sends BYE)
4) If modem status is deemed inoperable
5) If in receive mode and DSR falls, or DCD gone for more than 2.5 seconds
6) CPU massive failure

F. Data Transmission Protocol

1) Comparable to ISO 1745 except:
   a) When in receive mode, operates transparent, full duplex--626 protocol followed
   b) When in wait loop, if timer times out, next block is transmitted, instead of a retransmit
2) Control characters from 626 for data transmission are suppressed and only inserted as per ISO 1745
3) Typical transmission format

SOH/STATION#xx'/STX/ data (1k)/ETB/--wait time--/STX/ data /ETB/.....STX/last block of data/ETX/wait/"END OF XMIT"/BYE"/DLE/EOT (call terminated.)

During wait, looks for:
ACK - positive acknowledge
NAK - negative acknowledge
EOT - terminate call - end of transmission

VII. Programmable Features

A. Stack Memory Dump modes
   1) Never - holds all data in regardless of stack conditions
   2) Stack Full - transmits data when only 200 free bytes of stack remain
   3) Every Event - transmits each time any data goes into stack
   4) Upon request - transmits only when given proper command by user in program mode, or from remote location
   5) Every XX hours - transmits data in stack every XX hours
   6) Every XX hours w/overflow option - same as 2 and 5

B. Phone Number
   1) max of 16 digits, including WAIT-FOR-DIAL-TONE (.: key)

C. Station ID
   1) Maximum number = 99

D. Preset Values
   1) Transmit mode = upon request
   2) Phone number = 238
   3) Station ID = 25

VIII. Disturbance Data

A. Possible events

1) PHONE LINE DEAD -- Phone line becomes dead while modem is active or improper call termination procedure is used.

2) RS232C PORT DEAD - - DSR or CTS bad, or transmitter or receiver will not clear

3) MODEM DEAD - modem turned off due to failure of self-test during SYSTEM CHECK, or DSR fails, or transmitter fails to empty when DCD and CTS are valid

4) OVFLW STK OVFLW - overflow stack has memory full, data possibly lost ($ char will show up in dump)

5) MODEM BUSY - - Transmitter busy - - request for SYSTEM check but modem already active so test cannot be done

6) RAM MEM DEAD - CPU RAM insufficient to continue, shutdown time

7) NO CALL-128 TRY - Clears transmit request

8) RCV BUFF OVFLW - Buffer from remotely received CHAR FULL

9) DSR 626: OFF - RS232 port inoperable

10) DSR 626: ON - RS232 port is restored

11) IRQ STK OVFLW: IRQ stack overflowed - - possibly lost disturbance data from 6012 CPU to module interface

12) PHONE CALL IN: Received call

13) PHONE CALL OUT: Made a call out

14) PHONE CALL DONE: Modem hung up following proper call termination procedure: sends "BYE" followed by DLE (Data Link Escape) and EOT (End of Transmission)

15) NO DIAL TONE: During phone call attempt, if no dial tone is detected, the call sequence is terminated.

B. FORMAT

```
TIME=  XX:XX:XX.XX                    ↑
channel #   event                  Read Up
```

C. SHORT TERM ACCUMULATOR

Summary mode same as above except no time data.

6 INSTALLATION

To install the 6012 in the mainframe, proceed as follows:

CAUTION: Be sure unit is turned off.

a. Position the top and bottom rear corners of the plug-in module in the upper and lower tracks at the desired double slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the two top and two bottom captive screws to secure the double module to the mainframe.

7 CONNECTING THE 6012 TO THE PHONE LINE

Plug the phone line into the standard RJ11C jack on the rear panel of the 6012. Note that the red indicator on this panel lights whenever the phone line is active. Note: User must contact phone company before connecting to phone lines to inform it of the intent to connect an FCC-registered modem to the phone lines, and to provide them with the registration and ringer equivalence numbers from the rear panel of the 6012.

8 OPERATING THE 6012

8.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with the 6012 are described in Table 1. Figure 1 shows the typical front panel controls on a Model 626. For a description of controls common to overall Model 626 operation, refer to TM-106650.

Table 1. 6Ø12 Operating Controls

Item	Function
DATA pushbutton	When depressed, produces data summary printout.
PROG pushbutton	When depressed, produces a program summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing the PRESET switch recalls non-volatile factory program for that channel.
ENTER pushbutton	When depressed, transfers numeric keyboard values into 6Ø12 memory for processing.
FNC pushbutton	When depressed and followed by a 1, 2, 3, or 4, allows user to program either phone number, transmit mode station ID, or perform an immediate transmit.
NUMERIC pushbuttons	Used to enter numerical values for the various functions.

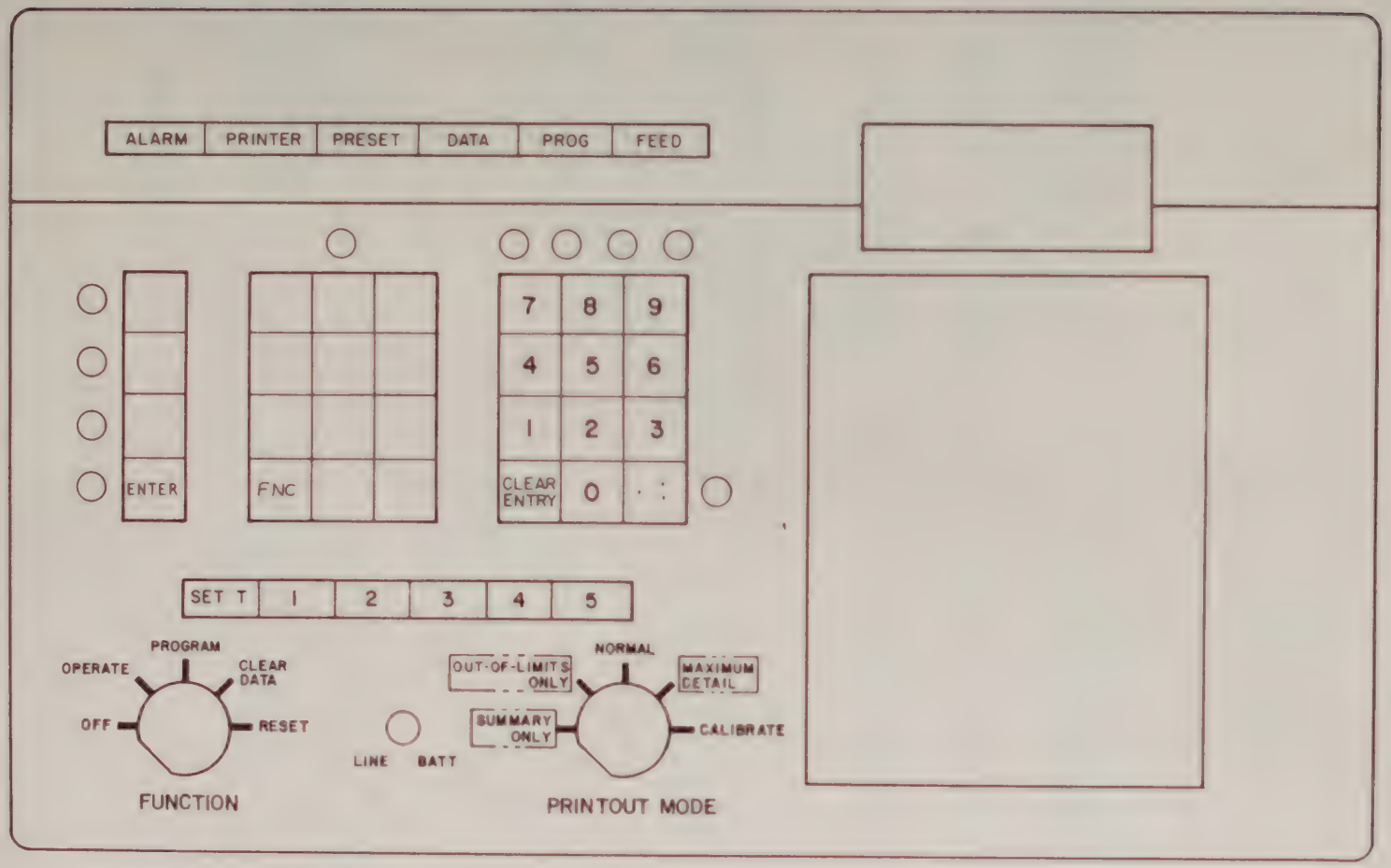


Figure 1. Typical Front Panel with 6012 Installed in Mainframe

8.2 Programming Procedure

Assume it is desired to program the 6012 as follows:

Phone number: 91 (wait-for-dial-tone) 234-3333
Station ID: 42
Transmit mode: Every 8 hours

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position (lower of the two slot positions that the 6012 occupies) of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red LED above the center bank of pushbuttons is lit. The following prompt message is printed:

```
FNC4=TRANSMIT
FNC3=STATION ID
FNC2=XMIT MODE
FNC1=PHONE #
```

↑ (read up)

d. The FNC pushbutton must now be depressed followed by the number (1-4) corresponding to the desired parameter (or function). Note that when this is done, the green LED adjacent to the ENTER key is lit, waiting for the ENTER key to be depressed.

(Assume a "1" was pressed for the following example.)

e. When the ENTER indicator goes out, the following prompt message is printed:

```
MAX # = 16
WAIT-FOR-DIAL-TONE
IN PHONE #,INCLUDE
ENTER # OF DIGITS
```

↑ (read up)

Note that two yellow LEDs are lit, indicating that the number of digits in the phone number (including any wait-for-dial-tone characters) must now be entered. (Leading zeroes must be entered.) In this example, there are nine digits and one wait-for-dial-tone for a total of 10 digits, so a 10 must be entered. When this is done, the green LED adjacaent to ENTER is lit, indicating that the ENTER key must be depressed.

Note that if the PHONE STATUS is BAD or BUSY, the above prompt will not be printed; either

```
PHONE BAD
   or
PHONE BUSY
```

will be printed and the program sequence returns to step c above (newprogram summary). The phone number cannot be changed if the phone status is bad or busy.

f. When the ENTER key is pressed, the following prompt message is printed indicating that the actual digits of the phone number must now be entered:

```
(WAIT-FOR-DT = .:)
ENTER DIGITS                    ↑
                              (read up)
```

g. A single yellow LED is now lit. At this point the phone number is entered by pressing the following sequence:

9, 1, .:, 2, 3, 4, 3, 3, 3, 3,

(Keep entering digits until the yellow LED goes out and the green ENTER LED is lit.) After the specified number of digits is entered, the yellow LED will go out and the green LED next to ENTER will light, indicating that ENTER must now be pressed. When ENTER is pressed, the new phone number will be stored in CMOS RAM and in the dialer. At this point, a new program summary will be printed along with the programming prompt messages.

NOTE

If CLEAR ENTRY was pressed at any point during steps e through g above, the programming sequence returns to step e.

h. Suppose that the next item to be programmed is the transmit (xmit) mode. While the red LED over the center bank of pushbuttons is lit, press FNC followed by a "2". When this is done, the green LED next to ENTER is lit, waiting for the ENTER key to be pressed.

i. When the ENTER key is pressed, the following list of transmit mode options is printed:

```
 W/ STK FLL OPT
5=EVERY X HOURS                 ↑
4=EVERY X HOURS
3=UPON REQUEST              (Read Up)
2=EVERY EVENT
1=STACK FULL
Ø=NEVER
PRESS:
```

A single yellow LED is now lit, indicating that one of the formats must now be entered. In this example, the desired transmit mode is every 8 hours, so a "4" is entered (for EVERY X HOURS). The green LED is now lit, indicating that the ENTER key must be depressed.

j. When the ENTER key is pressed, the following prompt is generated:

ENTER HOURS

Two yellow LEDs are lit indicating that the hours between transmits must now be entered. The value may be anywhere from Ø1 to 99 hours. In this case an Ø8 is entered. The green LED next to ENTER is illuminated, waiting for the ENTER key to be depressed.

k. When the ENTER is pressed, the new programming is stored in CMOS RAM. A new program summary is printed, showing the new program values and the programming sequence returns to step c above.

l. To program the station ID number, the FNC key must be depressed followed by a "3" when the yellow LED is lit. The green LED indicates that the ENTER key must be depressed.

m. When the ENTER key is pressed, the following prompt is printed:

ENTER ID #

At this point, two yellow LEDs are lit, indicating that the ID number (a value ranging from ØØ to 99) may be entered (in this example, an ID number of 42 was entered), followed by an ENTER.

n. When ENTER is pressed, the new ID number is stored in memory and an updated program summary is printed as well as the program instructions. The red LED above the center bank of pushbuttons is lit, indicating that further programming may now be performed.

NOTE

Parameters may be programmed in any order that is appropriate for the specific situation.

o. Suppose that an IMMEDIATE TRANSMIT of data is desired. This is accomplished in much the same manner as programming one of the other parameters for the module. However, the transmit mode must be programmed to UPON REQUEST. This is done by repeating step h and selecting a "3" for UPON REQUEST transmit mode. Note that if an immediate transmit is attempted with the transmit mode set to other than UPON REQUEST, the program sequence returns to step c above.

p. To accomplish an immediate transmit, proceed as follows: When the red LED over the center bank of pushbuttons is lit, press the FNC pushbutton. This results in a single yellow LED being lit. For an immediate transmit, a "4" must be pressed, followed by an ENTER.

NOTE

Changing the XMIT MODE clears any pending transmit requests (i.e. the 6Ø12 is trying to call but has not gotten thru yet).

q. After ENTER is pressed, the following prompt message is printed and a single yellow LED is lit.

IMMEDIATE XMIT
PRESS: 1=YES Ø=NO

This confirmation step is a safeguard against accidental transmissionswhich would result in the loss of data. If a "0" is entered, followed by ENTER, the immediate transmission sequence is aborted and the programming sequence returns to step c above. If a "1" is entered, the immediate transmission sequence is started and a message indicating such is printed:

! IMMEDIATE XMIT

A program summary is printed and the programming sequence returns to step c above.

r. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he/she may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program currently in effect may be obtained by simply depressing the PROG pushbutton.

8.3 Calling up the 626-PA-6012 (using a UDS103LD Modem on User End)

8.3.1 Dialing

a. Make sure that the TTY or CRT is properly connected to the rear connector of the modem and is set to 300 baud.

b. Place front panel switch of modem in the TALK position and the rear panel switch to ORIGINATE.

c. Make sure the phone is connected to the TELSET jack on the rear panel, and phone line to TELCO.

d. Lift the phone off the hook and dial the phone number at which the 6012 resides.

8.3.2 Logon

a. After the ringing stops (usually the first ring), listen for the Answer Back Tone (after the 2 second billing time wait period).

b. When the tone is heard, place the front panel switch in the DATA position (within 4 seconds).

c. A '?' should appear in 1 second. There is now 15 seconds in which to enter 'IDXX', where XX is the station ID.

d. If the above steps are all properly executed, then the 6012 will send 'XX-READY'. At this time, the data link is established and the TTY will operate as if it is connected directly to the RS232C port of the 626.

8.4 Receiving a Call from the 6Ø12-PA-6Ø12

8.4.1 Call Reception

a. Place the rear panel switch in the ANSWER position, then repeat steps a through c in paragraph 8.3.1.

b. When the phone rings, lift the phone off the hook and place the front panel switch in the TALK position.

c. In 2 seconds, the 6Ø12 will begin transmitting data, preceded by "STATION#XX" identification message.

8.4.2 Data Transmission

a. After the first 1k block of data (or partial block) is received, the 6Ø12 will wait for 1Ø seconds for:

1) Positive Ack. (^ F) - to terminate wait time.
2) Negative Ack. (^ U) - to rexmit last block of data
3) End of Transmit (^ D) - to terminate call

b. When last block is sent, an 'END of XMIT' message is sent, followed by a 1Ø second wait.

c. The 6Ø12 will then send a 'BYE' message and hang up.

9 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Engineering Customer Service Department and obtain an Authorization Number.

2. Fill out the Repair/Service Order enclosed in this manual and ship it with the equipment to the Customer Service Department.

CUSTOMER SERVICE DEPT.
DRANETZ ENG. LABS., INC.
1000 New Durham Road, CN-91
Edison, New Jersey 08818

REPAIR/SERVICE ORDER

Tel: (201) 287-3680
(201) 287-2536
TWX: (710) 987-9563
CABLE: DRANETZ

NOTE: THIS COMPLETED FORM MUST ACCOMPANY RETURNED EQUIPMENT

CUSTOMER SHIPPING & BILLING INFORMATION

CUSTOMER P. O. • _____ P. O. DATE _____

SHIP TO: _____ INVOICE TO _____

_____ _____

_____ _____

_____ _____

In Continental U. S., material will be returned by Dranetz to you by UPS, UPS Blue or other carrier chosen by Dranetz unless otherwise designated.

EQUIPMENT BEING RETURNED

Date of Original Purchase _____ Original P. O. • _____

Model No. _____ S/N _____

Model No. _____ S/N _____

Ancillary equipment also being returned (If you neglect this, these items may not be returned to you):

☐ Power & Other Cables _____ ☐ Instr. Book _____

☐ Plug-ins (incl. S/N) _____ ☐ Connectors _____

☐ Other _____

RETURN AUTHORIZATION

Have you discussed the problem with Dranetz Sales or Service personnel?

Dranetz Return Authorization • _____

By _____

If so, with whom _____ Date _____

Whom should the Dranetz Customer Service Dept. contact for technical questions?

_____

NAME (Print) DEPARTMENT TELEPHONE

DESCRIPTION OF PROBLEM

Please be detailed, explicit and complete. Include test data, if this helps to describe the problem.
IMPORTANT: Repairs cannot be made unless this section is completely filled out.
(Attach added sheets if necessary)

_____

_____

_____

_____

CHECK WHERE APPLICABLE: IS MALFUNCTION RELATED TO Warmup ☐ Temperature ☐

Intermittency ☐ Mechanical Handling ☐ Visual Defects ☐ Grounding ☐ Test Data Attached ☐

INITIATOR OF THIS ORDER

_____

NAME/TITLE SIGNATURE TELEPHONE

(SEE OTHER SIDE FOR INSTRUCTIONS)

IMPORTANT (ENCLOSE THIS ENTIRE FORM WITH EQUIPMENT)

INSTRUCTIONS FOR REPAIR ORDER – DRANETZ ENGINEERING LABS.

IMPORTANT: FOLLOW INSTRUCTIONS & USE THIS FORM. IT IS DESIGNED TO HELP US HELP YOU.

1. Before returning equipment to our factory, call our Customer Service Department, Tel:(201) 287-2535 Give the model No., serial number, and information on the problem.

   A. Our specialists may be able to solve your problem rapidly without equipment return.

   B. If equipment return is needed, you will be supplied with appropriate instructions and authorization information to expedite service.

2. If return is to be made,

   A. Fill out the other side of this form COMPLETELY.

   B. Enclose original of form INSIDE the shipping carton, preferably attached by masking tape to the equipment.

   C. Ship prepaid (including insurance); we will return prepaid unless otherwise advised by you.

   D. IMPORTANT - PACK PROPERLY! SHIPPING DAMAGE WILL BE CHARGED TO YOU!

NOTE:

Statement of Warranty - All products of Dranetz Eng. Labs., Inc. are warranted to the original purchaser against defective material and workmanship for a period of one year from the date of delivery. Dranetz will repair or replace, at its option, all defective equipment returned, freight prepaid, during the warranty period, without charge for repair, provided there is no evidence that the equipment has been mishandled or abused.

FILL OUT OPPOSITE SIDE OF THIS FORM AND RETURN WITH EQUIPMENT.

INSTRUCTIONS FOR REPAIR ORDER – DRANETZ ENGINEERING LABS.

Date of Issue: March 26, 1982 003082020

PRINTER PAPER REORDER FORM

The Series 606-616, 626, SER System 22, TEA and 3100 use specially treated thermal paper. This paper is supplied direct from the factory by Dranetz Engineering Laboratories (P/N 102, 714). Use of non-approved suppliers is not recommended as possible damage to the printer could result.

To insure rapid handling of your order, Dranetz Engineering Laboratories, Inc. has established two alternative plans for reordering printer paper. These are described below. Please check the plan you prefer and provide the necessary information. Return this form in the self-addressed envelope enclosed. Shipment will be within 48 hours of receipt of order.

STANDARD REORDER PLAN

Minimum quantity is 27 rolls.
Price is $2.95/roll.
FOB, destination, Continental U.S.
Send a purchase order specifying P/N 102, 714. shipping address, and billing address, if different.
You will be billed according to standard Dranetz Engineering Laboratories, Inc. procedures.

RAPID REORDER PLAN

Minimum quantity is 6 rolls.
Quantity:_____ rolls at $2.95/roll.
FOB destination, Continental U.S.
Total payment enclosed $_____.
A check or money order in the above amount must be enclosed.

Ship paper to:

_____

_____

_____

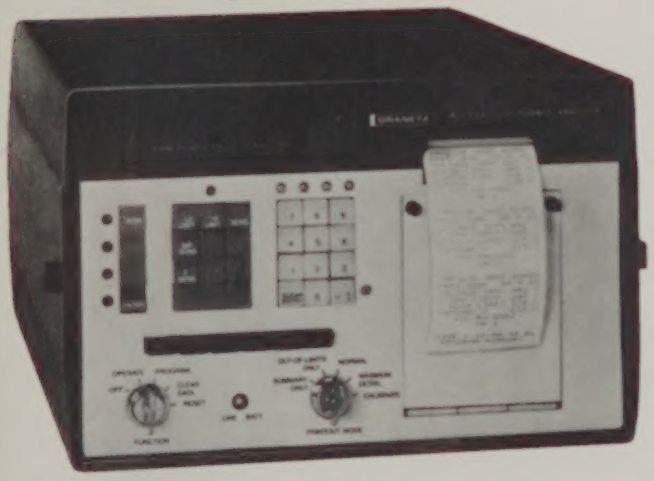
Prices above subject to change, confirm prices at time of order with Dranetz Plant Sales Department or designated representative.

DRANETZ
ENGINEERING LABORATORIES INCORPORATED
1000 New Durham Road · Edison, N.J. 08818 · Tel. (201) 287-3680
TWX: 710-997-9553
Cable: DRANETZ

ANNOUNCING THE

DRANETZ

Series 626 Universal Disturbance Analyzer



An extremely valuable tool for analyzing power transients and other anomalies that affect:

- **Computers**
- **Word Processors**
- **Telephone/Telecommunications Equipment**
- **Automated Production Systems**
- **Medical Instrumentation**
- **Military and Avionics Systems**

***Only* the Dranetz Series 626, with its distributed processing and modular design, offers you these features:**

- **Monitors sags, surges, frequency changes, impulse magnitude and duration on single or three phase AC (50, 60, or 400 Hz).**
- **Monitors one or more DC channels with sags, surges, impulse magnitude and duration.**
- **Common mode AC voltage (50-60 Hz).**
- **Temperature and humidity monitoring up to 100 feet from site.**
- **Built-in auto dial/auto answer modem with chronological disturbance event printout.**
- **Change of state/elapsed time modules.**
- **Accommodates up to five modules *simultaneously*.**
- **All modules program independently.**
- **Custom preset programs to eliminate set-ups.**
- **Built-in UPS for ride-through operation.**
- **"System check" to verify operation.**

Description

The Dranetz Series 626 is a Power Disturbance Analyzer designed for expansion to measure a wide range of parameters that affect computer operation. The unit has capacity for five input modules. Voltage disturbances are reported in terms of sag, surge, and impulse, including impulse duration. The mainframe provides all operating controls and a common time base to allow time correlation between independent input modules. The operator has full control over the system, including the exact voltage thresholds to be used by each module.

Input Modules

The Series 626 is unique in its ability to combine many measurements into one convenient package. Available plug-in modules include:

Single Phase AC: Reports sags, surges, impulses, frequency changes on 45-65 Hz power. Expandable to include impulse duration, strength, direction.

Single Channel DC: For 0.5-80 or 25-600 volts. Reports sags, surges, impulses. Expandable to include impulse duration or strength.

Three Phase AC: Reports sags, surges, impulses, including impulse duration, and frequency changes on 45-65 Hz power.

Common Mode AC: Reports common mode disturbances in grounded AC systems, 45-65 Hz.

Logic Event: Eight binary channels report changes of state in diagnostic alarm signals.

Event Time Accumulator: Same as Logic Event module above, plus ability to accumulate total time spent in either alarm or normal state.

Temperature and Humidity: Reports changes in single channel each of temperature and relative humidity. Adjustable upper and lower limits.

Three Phase 400 Hz, AC: Same as Three Phase AC Module above, but for 350-450 Hz.

Mass Storage and Communications: Stores data in original chronological form. Printouts are remotely accessible via built-in auto dial/auto answer modem.

Easily Programmed By Your Operator

Prompting LED's guide even inexperienced operators through full set-up procedure. All controls are provided on front panel. Remove key to secure set-ups.

Four Printout Modes Show Only the Detail Required

Because different monitoring situations require varying degrees of printout detail, four printout modes are available as an option. A key switch is provided for security.

SPECIFICATIONS

626 MAINFRAME

General
The mainframe houses up to 5 plug-in modules, and supplies all necessary supply voltages and operating controls. The controls enable easy set-up of all parameters, while maintaining real time and a day count for extended monitoring. Even while turned "off," the mainframe maintains its clock and memories for at least 1 to 3 months.

Operating System
The mainframe CPU identifies the type of module installed in each slot and controls plug-in operation.

Controls
Three section keyboard for simple programming and real time set up. Pushbuttons select DATA SUMMARY, PROGRAM SUMMARY, PRINTER ON/OFF, PAPER ADVANCE, ALARM ON/OFF, and PRESET.

FUNCTION keyswitch for OFF/OPERATE/PROGRAM/CLEAR DATA/RESET. Keyswitch is *locked* by removal of the key in OPERATE position. The programming keyboard is disabled except in PROGRAM position.

PRINTOUT MODE keyswitch is available in two versions. The standard version includes NORMAL mode and CALIBRATE. OPTION 101 allows user selection of the other 3 printout modes (SUMMARY ONLY, OUT-OF-LIMITS ONLY and MAXIMUM DETAIL). Removal of the key *locks* the keyswitch in desired position.

Calibrate
Activates calibration routine in plug-in modules. Results are easily compared to standards to assure proper operation.

Remote Operation
RS-232C for data output and remote power diagnosis. Handshaking capability is included to assure proper data transfer.

Thermal Printer
Accepts paper roll 2¼" x 140'.

Paper Low Protector
Optical sensor detects **paper low** condition. Mode of operation changes to SUMMARY ONLY to prevent printer damage.

Power Requirements
90-140 or 180-250 VAC, 47-450 Hz. 50 watts nominal.

Internal UPS
10-40 minutes full operation from internal batteries; 6-10 hour recharge time. Extended operation available from external DC source. Requires +12 VDC @ approximately 2 Amps.

Size
7½" H x 11" W x 15½" D (19 cm H x 28 cm W x 39 cm D).

Weight
20 lbs. (9 Kg) approx.

Environmental
Temperature: +10° to 40° C operation;
−40° to +55°C storage.

Mainframe Options
101: Multi-mode Printout. Normal is standard. Option allows user selection of other three printout modes with front panel printout mode keyswitch.
102: Field contact supply for use with 626-PA-6007 and 626-PA-6011.

Accessories Available
- Current Probe for Impulse Direction
- Reusable Shipping Container
- Additional Input Cables and Connectors

PLUG-IN MODULES

PLUG-IN	INPUTS	SELECTABLE THRESHOLDS	OPTIONS
1Ø AC 626-PA-6001-( )**A**	50-600 VAC 45-65 Hz	High Limit: 51-600 VAC / Low Limit: 50-599 VAC Sensitivity: 1-60 VAC / Frequency: 0.2-3.0 Hz Impulse: 25-4000 Volts	Opt. 101: Impulse Duration and Direction Opt. 102: Impulse Strength and Direction Opt. 103: Custom Preset
Low Range DC 626-PA-6002A-( )**B**	0.5-80.0 VDC	High Limit: 0.6-80.0 VDC / Low Limit: 0.5-79.6 VDC Sensitivity: 0.1-20.0 VDC / Impulse: 0.5-80.0 Volts	Opt. 101: Impulse Duration Opt. 102: Impulse Strength Opt. 103: Custom Preset
High Range DC 626-PA-6002C-( )**B**	25-600 VDC	High Limit: 26-600 VDC / Low Limit: 25-599 VDC Sensitivity: 1-60 VDC / Impulse: 25-2000 Volts	Opt. 101: Impulse Duration Opt. 102: Impulse Strength Opt. 103: Custom Preset
3Ø AC 626-PA-6003-( )**B**	50-600 VAC 45-65 Hz	High Limit: 51-600 VAC / Low Limit: 50-599 VAC Sensitivity: 1-60 VAC / Frequency: 0.2-3.0 Hz Impulse: 25-4000 Volts	Opt. 101: Custom Preset
AC Neutral-Ground 626-PA-6006-( )**B**	2-50 VAC 45-65 Hz	High Limit: 3-30 VAC / Sensitivity: 1-15 VAC Impulse: 25-4000 Volts	Opt. 101: Impulse Duration and Direction Opt. 102: Impulse Strength and Direction Opt. 103: Custom Preset
Event Monitor 626-PA-6007	8 Inputs 2.0 VDC (Nominal) Trip Point	Validation (Debounce) Time: 5, 10, 20, 40, 80, 160, 320 mSec Each Input: Normally Open or Normally Closed	Opt. 101: Custom Preset
Temperature and Humidity 626-PA-6008	Temp: 0° to 100°C Rel. Hum: 0 to 100% RH	**Temp.** **R.H.** High Limit: 1-100°C 1-100% Low Limit: 0-99°C 0-99% Sensitivity: 1°C-(Hi-Lo) 1%-(Hi-Lo)	Opt. 101: Custom Preset
3Ø 400 Hz 626-PA-6009	50-600 VAC 350-450 Hz	High Limit: 51-600 VAC / Low Limit: 50-599 VAC Sensitivity: 2-50 VAC / Frequency: 1-25 Hz Impulse: 50-4000 Volts	Opt. 101: Custom Preset
Event Time Accumulator 626-PA-6011	8 Inputs 2.0 VDC (Nominal) Trip Point	Validation (Debounce) Time: 5, 10, 20, 40, 80, 160, 320 mSec Each Input: Normally Open or Normally Closed Accumulate Alarm or Normal Time	Opt. 101: Custom Preset
Mass Storage and Communications 626-PA-6012	Input Data From 626 RS-232C Port Stored Data Available Via Integral Auto- Answer/Auto-Dial Modem	Printout Mode: Various Automatic and Manual Modes. Phone Number: Up to 16 digits, including wait-for-dial-tone Station (Remote) ID: 00-99	Opt. 101: Custom Preset Opt. 102: 450 Stored Disturbances (200 is standard)

A Specify Desired Suffix:
1: 60 Hz Calibrator with Barrier Strip Input
2: 60 Hz Calibrator with Connector Input
3: 50 Hz Calibrator with Barrier Strip Input
4: 50 Hz Calibrator with Connector Input

B Specify Desired Suffix:
1: Barrier Strip Input
2: Connector Input

We reserve the right to change specifications without noti

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